tomy site. Secondary carcinoma of the gall-bladder seldom is accompanied by stones because of the comparatively short duration of the disease and also because the invasion is by way of the serous coat of the bladder. It would seem rather that cancer of the gall-bladder is more prone to follow ulcerative processes and their consequent cicatrices than upon the mere presence of stones, just as we believe to be the case in gastroduodenal carcinoma.

In conclusion, we wish to emphasize the great difficulties of gall-bladder disease diagnosis in many cases. We have indicated some of the reasons why there is such difficulty. Frequently one must depend upon clinical intuition, and often William Mayo's dictum is realized upon "that where there is trouble in the right upper quadrant only a laparotomy will reveal the exact cause of the trouble." This should be true in fewer instances if we combine the evidence obtained by good, careful history-taking, physical examination, laboratory and roentgen-ray study. The case of long-standing indigestion, gas, eructation, etc., with perhaps interpolated acute abdominal attacks, is more or less typical, although the picture of gall-bladder disease is a variable one. The possibility of latent stones and some theories for gall-stone formation are mentioned. The relationship of cancer and gall-stones is indicated and some points are made in the controversy between those who practice cholecystotomy or cholecystectomy as an operation of choice. The study of duodenal contents is mentioned as a diagnostic aid and the practice of duodenal lavage in catarrhal jaundice and primary acute gall-bladder attacks is mentioned as a possible therapeutic measure. After any degree of gall-bladder chronicity is attained such lavage or medical measures are of little avail, and, indeed, frequently the problem is not met by surgery.

PHYSICAL EXERCISE IN HEART DISEASE.

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NEW YORK.

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One of the important things which physicians have learned from their war experience is that physical exercise plays a dominant role in the hygiene of normal men and that certain circulatory disorders, variously termed *effort syndrome, neurocirculatory asthenia*, etc., may be benefited by the same measure. With no more than this experience it would seem reasonable to believe that a therapeutic measure as valuable as exercise has proved itself to be might be useful in circulatory disorders of a more serious nature.

The great drawback even to experimenting with exercise in disease of the heart has been the difficulty of determining just when a patient's heart was overtaxed by physical work and a lively fear of the results of such an overtaxing. Physicians have been extremely cautious about advising these patients to exercise. Generally the advice has been to be careful not to overdo and a very potent therapeutic measure in circulatory disease has been gradually discarded.

The term *exercise tolerance* has been frequently used of late and the implication has been that the above-mentioned difficulty has been solved. Actually the same dilemma confronts us. This term simply puts before us the conception that we can best judge of the heart's reserve power by the way a person tolerates exercise rather than by various other procedures. This conception is undoubtedly valid, for the best way to judge of an organ's capability is to set it doing its own particular work and base our judgment upon the result of such experiments. A person's ability to tolerate physical work depends essentially upon his heart's reserve power provided his lungs and body muscles are functioning in a normal way. Inability to tolerate a given amount of work means that the heart's reserve power has been overtaxed,[1] and the problem of deciding when this occurs is no different from what it has always been.

The fact that the term *exercise tolerance* expresses the correct method of ascertaining the amount of cardiac reserve power, would seem enough justification for its adoption. It has, however, a certain drawback. We have no form or amount of physical work which will serve as a standard capable of being translated into other forms of physical activity. A patient's heart may easily tolerate the exercise of walking on a level and be decidedly overtaxed by climbing a short flight of stairs. To speak of a person's *exercise tolerance*, therefore, without qualifying the word *exercise* means but little.

A brief summary of what we know about the circulatory physiology of physical work and of some experiments on patients with different amounts of cardiac reserve power will give us an insight into the principles to be followed in prescribing exercise in heart disease.

Circulatory Physiology of Physical Work. The salient phenomena accompanying muscular work are a rise in arterial pressure, a larger output from the heart and an increased flow of blood through the heart and working muscles.

The rise of blood-pressure is due to the increased output of the heart into a stream bed which has been narrowed by constriction of the splanchnic vessels. The rise implies, therefore, that the heart is able to increase its output and that the vasomotor center is acting upon the splanchnic vessels. Chiefly by means of the

[1] Bainbridge, F. A.: The Physiology of Muscular Exercise, 1919, p. 138.

increased blood-pressure are the heart muscle and working muscles provided with more blood—that is, with oxygen sufficient to satisfy the increased metabolism incident to work.[2] A subsidiary factor in producing the increased blood supply is relaxation of the arterioles and capillaries in the working muscles and of the coronary vessels in the heart. The rise of systolic blood-pressure during work is the most significant fact in the circulatory physiology of muscular exercise. It means that the heart is acting more energetically, that it is increasing its output and that the heart muscle is being supplied with more blood.

The course of the blood-pressure during work has been determined by a number of observers, and the course after work has been even more carefully investigated because of the easier technic. The relation between the pressure during work and that after work has received little attention.

In 1916 I published a record of experiments upon three normal people and upon two patients suffering from cardiac disease in whom the systolic blood-pressure curve was plotted during and after the performance of work.[3] In the three normal persons it was shown that the pressure rose *during* work and the degree of rise was proportional to the intensity of this work; also, that the height of blood-pressure during the first sixty seconds *after* work approximated the height reached during work. The records then published of the experiments on two patients with cardiac disease were incomplete because of the infrequent readings made during work. These latter experiments have been repeated.

Three patients were selected having different degrees of cardiac reserve power. The first patient was confined to bed and suffered from aortic regurgitation and a marked cardiac failure. His legs were much swollen, there was some fluid in the abdomen and he was dyspneic.

The second patient had a chronic myocarditis and auricular fibrillation. He was able to be up and about, but his ankles showed almost constantly some edema and his heart's reserve power was very slight.

The third patient had a double mitral lesion and a moderate reserve power. She could walk about and do light household work.

Twenty-five experiments were carried out on these three patients. Work was furnished for the bed patient by alternately flexing the thighs on the abdomen and for the walking patients by the same maneuver, the patients standing during the work. Each working period lasted from thirty seconds to two minutes. Naturally the rate at which they worked varied considerably. The longest period of work always resulted in overtaxing the patients' hearts, earlier or later in the working period, as was shown by their marked dyspnea

[2] Bainbridge, F. A.: The Physiology of Muscular Exercise, 1919, p. 86.
[3] Barringer, T. B., Jr.: Arch. Int. Med., 1916, xvii, 363-381.

and fatigue. The blood-pressure was read every ten seconds by auscultation *during* and *after* work. The following charts depict a typical series of experiments in each patient and also the same experiments in a control with normal heart.

These experiments show the following facts: *During work* the pressure rose and reached its highest figure during the greatest

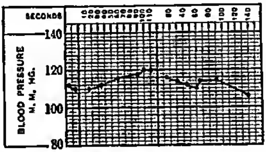

CHART I.—Curve of systolic blood-pressure during and after work in a normal person. Space between the two heavy perpendicular lines represents working period. Work furnished by flexing the thighs alternately on the abdomen at a rapid rate.

amount of work. *After work* the rise noted was, in the majority of instances, greater than that observed during work, and from its height we gained an idea of the height which had been reached during work. A "delayed rise" and prolonged fall were noted whenever the work overtaxed the heart. The rise in pressure both during and after work was much more marked than was noted in the normal control. Very small amounts of work produced very marked rises in blood-pressure in these patients with damaged

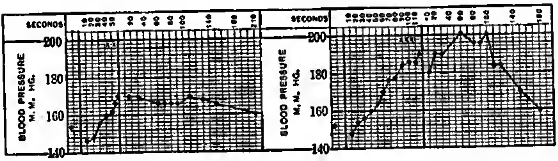

CHART II.—Curve of systolic blood-pressure during and after work in patient C. R., confined to bed, suffering from aortic regurgitation and extreme cardiac failure. Legs swollen; free fluid in abdominal cavity. Space between the two heavy perpendicular lines represents working periods of sixty and one hundred and twenty seconds respectively. At x^2 patient was dyspneic. At x^3 patient was very dyspneic (respirations 43 per minute) and fatigued, and it was apparent that he could work but a few seconds longer.

hearts. It would require very much larger amounts of work to produce as great rises in normal persons. We have seen that the increased cardiac output is the chief factor in producing the rise in blood-pressure in normal hearts. It seems very improbable that a damaged heart could increase its output enough to cause such high blood-pressures, as we have noted in our experiments, particularly

since the work was very small in amount. It is caused much more probably by an exaggerated activity of the vasomotor center.[4] This high pressure makes it increasingly difficult for the ventricle to empty itself, thus tending to produce an insufficiency.

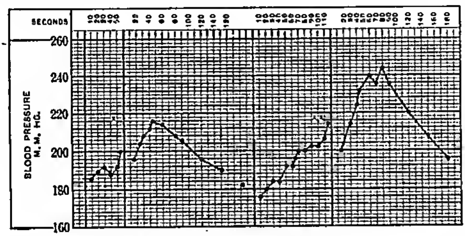

CHART III.—Curvo af systalic blood-pressure during and after wark in patient J., suffering from chronic myocarditis, cardiac hypertrophy, auricular fibrillatian and maderate cardiao failuro. Potient was up ond about but showed almast canstantly somo pretibial edema and could not climb a short flight of stoirs without distress. Spaco between tho two heavy perpendicular lines represents working periods of sixty and one hundred and twonty seconds respectively. At x^1 patient dyspneic; at x^2 decidedly dyspneic ond exhousted. In rooding the blood-pressure tho height at which the first strong beots came through was recorded. It is iotcresting to noto that tho heort in this patient with ouriculor fibrillation reooted to exerciso in tho somo monner os did the other potients with rhythmical heart oction.

Up to a certain limit exercise must act upon a damaged heart exactly as it does upon a normal heart; that is, increase the cardiac output, increase the blood supply of the heart muscle and raise the blood-pressure. As soon as this limit is exceeded the patient becomes markedly dyspneic, the excessive rise in blood-pressure

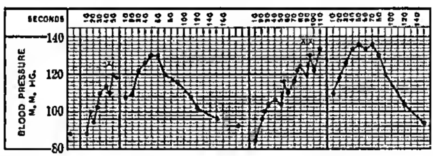

CHART IV.—Curve of systolic blood-pressure during ond ofter work in patient D., suffering from mitral stenosis ond regurgitotion ond smoll cordiac reserve power. Sho was obla ta da light housework ond exercise as shown in Tabla I. Spoce between two heavy perpendioulor lioes represents working periods of sixty ond one hundred ond twenty seconds respectively. At x patient dyspoeic. At x^2 respirations were 48 per minuta aod it was apparent that patient could work but a few secands longer.

we have described ensues and a temporary insufficiency is produced. The heart's reserve power has been exceeded. Naturally, when a heart has no reserve power, as in Case II, no exercise, however

[4] Personol communication from Dr. F. A. Bainbridge.

Walking is perhaps the best example of the second, milder type of exercise. This should be at first on a level. The patient should not talk and should not walk against a strong wind. A certain distance should be covered at a fairly rapid gait which can be determined only by experiment and then the patient should rest for two or three minutes; then repeat the walk and rest.

Other forms of mild exercise suitable for heart patients are croquet-playing, setting up exercises in which the arms and legs and not the trunk are moved and dancing (limited to one step). As the patient's reserve power increases one of the more energetic types of exercise should be added to the daily regimen. Whatever the exercise it should be determined on two successive days by the methods outlined above if it overtaxes the patient's cardiac reserve power.

A comparison of walking, stair-climbing and swinging dumb-bells by the same patient will give a quite correct idea of the relative intensities of these different forms of physical activity.

TABLE I.—D. B., AGED TWENTY-TWO YEARS; MITRAL REGURGITATION AND STENOSIS; SMALL CARDIAC RESERVE POWER. IS WALKING ABOUT AND DOING VERY LIGHT HOUSE WORK.

Date.	Stair climbing.	Walking on level.	Swinging 1-pound bell.
1920. May 16	*16 feet rise in 15 seconds.* Pulse before . . . 72 Pulse after . . . . 120 Blood-pressure before . 66 Blood-pressure after . 120 (highest) Delayed rise and prolonged fall present. Respiration before . 28 Respiration after . . 42	*400 feet in 2 minutes.* Pulse before . . . 78 Pulse after . . . . 120 Blood-pressure before . 66 Blood-pressure after . 124 Normal curve of blood-pressure. Respiration before . 24 Respiration after . . 36	*10 times in 20 seconds.* Pulse before . . . 84 Pulse after . . . . 112 Blood-pressure before . 100 Blood-pressure after . 120 Delayed rise and prolonged fall present. Respiration before . . 24 Respiration after . . 36
	22 feet rise in 30 seconds. Pulse before . . . 72 Pulse after . . . . 132 Blood-pressure before . 62 Blood-pressure after . 142 Delayed rise and prolonged fall marked Respiration before . 28 Respiration after . . 50	*900 feet in 4 minutes.* Pulse before . . . 78 Pulse after . . . . 132 Blood-pressure before . 68 Blood-pressure after . 128 Delayed rise and prolonged fall present Respiration before . 24 Respiration after . . 42	*15 times in 30 seconds.* Pulse before . . . 84 Pulse after . . . . 132 Blood-pressure before . 100 Blood-pressure after . 132 Delayed rise and prolonged fall present Respiration before . . 28 Respiration after . . 42
June 7	*10 feet in 26 seconds.* Pulse before . . . 66 Pulse after . . . . 88 Blood-pressure before . 66 Blood-pressure after . 108 Normal curve of blood-pressure Respiration before . 24 Respiration after . . 32	*1360 feet in 6 minutes.* Pulse before . . . 60 Pulse after . . . . 108 Blood-pressure before . 86 Blood-pressure after . 166 Normal blood-pressure curve Respiration before . 28 Respiration after . . 36	*Swinging 5-pound bell 10 times in 26 seconds.* Pulse before . . . 66 Pulse after . . . . 106 Blood-pressure before . 84 Blood-pressure after . 108 Normal curve of blood-pressure Respiration before . . 24 Respiration after . . 32
	22 feet in 30 seconds. Pulse before . . . 66 Pulse after . . . . 120 Blood-pressure before . 88 Blood-pressure after . 120 Delayed rise and prolonged fall present Respiration before . 24 Respiration after . . 42		*15 times in 30 seconds.* Pulse before . . . 64 Pulse after . . . . 120 Blood-pressure before . 88 Blood-pressure after . 116 Delayed rise and prolonged fall present Respiration before . . 28 Respiration after . . 48

Table I shows that on May 16 this patient could not swing a one-pound bell ten times nor climb a short flight of stairs without overtaxing her heart. She could, however, walk 400 feet on the level with normal reactions. On June 7 she showed decided improvement, for she was able to do some stair-climbing, swing a 5-pound bell ten times and walk much farther without overtaxing her heart. At this date she was put on both energetic and mild forms of exercise.

It is a difficult matter to translate any given amount of a particular form of exercise into other forms of physical activity. It can be stated, however, from a number of experiments on different patients similar to the ones just quoted, that a patient who can swing a 5-pound bell ten times in twenty seconds can climb slowly a flight of stairs with a 10-foot rise, can walk easily on the level and can perform light, physical work without overtaxing the heart. A patient who can swing a 10-pound bell ten times without overtaxing his heart can walk as long as one-half hour up a slight grade and can play nine holes of golf over not too hilly a course.

Stair-climbing and swinging dumb-bells afford, perhaps, the best test exercises for heart patients. The test of hopping on one foot 100 times, which was much used in the army, is thoroughly unsuitable because the actual amount of work performed and the time of performance vary greatly with each individual. The work done depends upon the height which the body rises with each hop. This varies with each person and varies even in the same individual, for the later hops are lower than the earlier ones; again, the time taken to perform this test varies greatly. Obviously, then, with these two variables the amount and the rate of work the circulatory reactions will differ greatly and afford no basis for comparison.

It must be emphasized that exercises should not be given to patients who are suffering from even a mild reinfection of a diseased heart, nor should they be given until such an infection is well over, as shown by a normal temperature for from five to seven days. The administration of digitalis to a patient is not a contra-indication to exercise, for we have exercised such patients many times with benefit. Digitalis favorably influences the action of the heart during exercise, as we shall show in a later paper.

There is another adjunct to exercise of much importance, and that is weight-reduction in patients who are overweight. Heart patients are inclined to grow stout because of the enforced limitation of their physical activities and because of lack of specific dietetic instructions. I have been impressed with the fact that exercise in conjunction with weight-reduction produces a more rapid and more marked increase of the heart's reserve power in these patients than does exercise alone. The reasons for this are not clear. Changes in the total metabolism, the slight increase in the size of the stream bed due to the formation of new capillaries in the fatty tissue, better pulmonary ventilation—probably all these play a part.

The history will be summarized of one patient who represents a class in which particularly excellent results were obtained by this procedure.

Mrs. M., aged seventy years. For ten years she had suffered from angina pectoris. This had steadily grown worse until, in 1919, she was unable to walk at all without causing an attack of pain and dyspnea. On January 8, 1920, I first saw this patient in an attack of pulmonary edema. She was a very obese woman, 5 feet, 2 inches tall, weighing 200 pounds, and seemed to be on the point of death. Her pulse was 120 per minute, regular rhythm, and her blood-pressure 140-80. The heart sounds could not be heard because of the moist rales heard all over the lungs. Her electrocardiogram taken later showed slight myocarditis and a left ventricular predominance. She recovered from the attack and was put on tincture digitalis, diuretin and a strict diet of four glasses of milk, two glasses of water and six soda biscuits daily, with rest in bed. The following table summarizes her course of treatment:

TABLE II.—COURSE OF TREATMENT IN PATIENT MRS. M.

Date.	Weight.	Diet.	Exercise.	Remarks.
1920. Jan. 8	200	800 calories: 0 soda biscuits 4 glasses milk 1 glass water	Rest in bed until Jan. 20	Tincture digitalis and diuretin.
Feb. 12	180	1100 calories: 1 egg 1 portion vegetable 1 slice bread and butter 0 soda biscuits 4 glasses milk ½ grape-fruit Stop fluid restriction	Up and about room	Stop digitalis and diuretin.
Feb. 21	178½	The same as on Feb. 12	Walk one block—5 closes;	
Mar. 11	175½	1500 calories: 1 lamb chop 2 slices bread and butter 0 soda biscuits 1 portion vegetable 4 glasses milk 1 lettuce salad ½ grape-fruit	Walk two blocks—8 closes; light calesthenics (flex thighs on abdomen alternately ten times while standing—3 closes)	
Mar. 17	173	The same as on Mar. 11	The same as on Mar. 11	
Mar. 24	171¼	The same as on Mar. 11	Increase walking and calesthenics	
April 14	160	2000 calories	Walk four blocks—10 closes; calesthenics (flex thighs 12 times—0 closes)	No precordial pain during exercise.
May 20	165	No dietetic restriction except meat but once daily; weight not to be increased	Walk sixteen blocks—3 closes; climb 1 flight of stairs 15 feet	No precordial pain during exercise.

The calisthenics noted above belong to the mild type of exercise, for each close produced no greater rise in blood-pressure than from 10 to 20 mm. of mercury.

Summary. At the end of six months this patient had lost 35 pounds in weight and was able to walk three-fourths of a mile without stopping and climb one flight of stairs without producing any anginoid symptoms. This compares very favorably with her condition during 1919, when she was unable to walk at all because of attacks of angina caused thereby.

I have found fluid restriction of minor importance compared with weight-reduction except in patients who have considerable edema. It has been a difficult matter to convince patients that weight-reduction means less work for the heart to do, and many physicians feel that the reduction of weight in heart patients is a dangerous procedure unless done very gradually and very moderately. In the past five years in approximately thirty patients I have never seen "weakening" of the heart result from even a radical weight-reduction if at the same time the patient was exercised properly.

In the light of our knowledge of the circulatory physiology of exercise it seems quite certain that physical exercise must not only increase the resistance to general infections of patients with heart disease, exactly as it does in normal people, but that in all probability it makes the heart itself more resistant to the serious menace of reinfections.

There can be no excuse in the majority of instances for advising heart patients against exercise nor any reason for not being specific and definite when prescribing this valuable therapeutic measure.

OCCULTISM WITH PARTICULAR REFERENCE TO SOME PHASES OF SPIRITISM.[1]

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The term, "occultism" is derived from the Latin, meaning hidden or concealed. As sometimes used the word has a special significance, referring to Oriental sects or cults which concern themselves with religious mysteries like the Vedanta or theosophy. Theosophy is a particular phase of occultism, its disciples believing, as the name implies, that they have a direct knowledge of God through spiritual intercommunication. In comparatively recent years the theosophy of the East has found disciples in the Western

[1] Presented to the Philadelphia County Medical Society, January 12, 1921.